Wed007 and dBWed

Noise Dosimeter / Exposure meter

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1. GENERAL PRESENTATION

1.1. Introduction

Nowadays, occupational noise is a matter of concern to 3 out 10 workers, which represents 3 million individuals exposed to a noise level higher than that listed in the standard. Evolution has been particularly fast during the past 10 years. Long-time exposure to occupational noise results in irreversible occupational deafness, which has been recognised as an occupational disease since 1963. This progressive and insidious disease becomes perceptible and annoying for the worker after several years only. The harmfulness of noise on hearing depends on the exposure level and duration. The threshold recognised by the current regulations is 85 dBA for an 8-hour exposure. In France, occupational deafness represents about 33% of the pensions paid by the Social Security to compensate all occupational diseases. It is worse for young and senior workers. Currently, the average cost of occupational deafness is estimated to 100 k€.

European Directive 2003/10/CE deals with minimum safety and health prescriptions relative to workers' exposure to risks due to physical agents. It has recently been transcribed into all national laws of Member States. These new regulations define exposure limit values triggering actions; employers are now under the obligation to determine occupational risks and adopt appropriate solutions to prevent them.

Thresholds for daily levels of exposure to noise and peak sound pressure are set to:
- Limit exposure levels: $L_{EX,8h}$ = 87 dB(A) and ppeak = 200 Pa
- Upper exposure values triggering action: $L_{EX,8h}$ = 85 dB(A) and ppeak = 140 Pa
- Lower exposure values triggering action: $L_{EX,8h}$ = 80 dB(A) and ppeak = 112 Pa.

Brought into force as soon as issued, the directive deals with the following main chapters:

- determination and assessment of risks: noise levels on the work place must be measured by competent professionals based on a representative sample. The assessment must be carried out on a regular basis.
- deletion and reduction of the exposure: the control of technical elements to attenuate noise emission must occur on site. Regular maintenance operations must be carried out on machines to avoid additional noise.
- availability of individual protections: suitable hearing protections must be offered when allowed minimum values are exceeded. The proper use of individual protections must be checked.
- limitation of the exposure: workers must not be exposed to a noise higher than the limit values.
- information and training of workers: the staff must be informed of risks related to exposure, methods allowing reducing them, authorised limits and appropriate use of protections. Furthermore, workers are invited to take part to noise reduction approaches.
- health monitoring: workers exposed to levels higher than limits must take auditory tests. Also, the employer is responsible for updating medical records, which must be made available to workers.

In France, Decree 2006-892 and the Order of July 19, 2006 define safety and health prescriptions applicable in case of workers' exposure to noise-related risks and modifying the Labour Code.

In order to assess the possible exceeding of values triggering the preventive action, the peak sound pressure level, the daily noise exposure level, and, if need be, the weekly noise exposure level, are determined according to the guidelines of Standard NF S 31-084 "Measurement method for occupational noise exposure levels". Methods used can include a sampling representative of the worker's exposure. The assessment of measurement results takes into account the measurement uncertainty determined according to metrological practices.

Furthermore, to assess the compliance with limit values, when the worker wears individual hearing protections, the worker's effective exposure to noise is determined according to the guidelines of Standard NF EN ISO 4869-2 "Individual noise protections – Part 2: Assessment of A-weighted sound pressure levels in case of the use if individual noise protections".

In Europe, Member States were granted 3 years to perform the transcription of the European Directive, i.e., until February 15, 2006. To this date, most European countries have national laws relative to workers' exposure to noise-related risks.

In the United States, the Occupational Safety and Health Administration (OSHA – 1970), which is dependent on the Ministry of Labour, is in charge of regulations, in particular regarding safety and health.

In order to meet the requirements of health and industry specialists in this statutory context, 01dB-Metravib has designed and developed dosimeter Wed007 and processing software dBLexd. Integrating the operating requirements of users, this device allows for an innovating and optimised approach on the work place. Wed007 and dBWed are the first in a new generation of instruments that allow for occupational noise monitoring and detailed acoustic studies on the work place.

By dissociating the human-computer interface and the acoustic data acquisition and processing unit, the Wed007/dBWed set enables the user to study the work station without disturbing the tasks of the individual wearing the dosimeter.
The human-computer interface consists of a Pocket PC, which allows improving the ergonomics of various functions and can manage up to 5 networked dosimeters/exposure meters at the same time.

1.2. Electronics

Built around an ARM processor and having a flash memory of 256 MB, Wed007 can measure, calculate and store all indicators and samples allowing accessing to the detailed study of the work station. Indicators are transferred, through a Bluetooth connection, to the Pocket PC, which displays them in a clear and user-friendly way on its colour screen.
Powered by a Lithium-Ion battery, Wed007 can be used to perform long-term measurements during one week.

1.3. Software

The modular and upgradeable features of the software base ensures the durability of the instrument.

Two separate software units provide intelligence to the dosimeter / exposure meter:
- A processing unit that performs signal processing and calculations: Wed007.
- A management unit, dBWed, which manages the human-computer interface on the Pocket PC.

1.4. Ergonomics

*Excerpt from the animation on www.dosimeter-**01db**.com*

1.4.1. Wed 007

Wed007 consists of a light and ergonomic housing. Its "soft touch" texture ensures a good feel of the instrument, combined with a pleasant sense of touch.

There are four LED on the front panel of Wed007 that provide essential information on the status of the instrument. There is a 5th LED on the upper part, at the basis of the microphone, which informs the individual wearing the dosimeter of a possible threshold violation.

- "Charger" LED: provides information on the operating of the battery charger.
- "Calibration" LED: active during the calibration phase.
- "ON" LED: turns on when the instrument is powered up and during the measurement, battery alarm indicator, etc.
- "Bluetooth" LED: provides information on the status o the wireless connection.

Two keys are used to control Wed007:
- An on/off key to start the instrument and the measurement (in stand-alone mode);
- A calibration key to perform calibration operations in stand-alone mode.

With these keys and these indicators, Wed007 can be used as a stand-alone dosimeter.

1.4.2. dBWed

Software dBWed, which is embedded in a Pocket PC or in a PC, allows for a flexible and user-friendly management of measurements. With this instrument, the user can indeed get control over the Wed007 unit and operate it remotely (calibration and configuration, real-time display of essential indicators). At the end of the measurement session, the user can retrieve and save time data stored in Wed007.

During the measurement, the operator can also associate comments with metrological data as written notes or oral comments. This function is very often used for the study of noise in the work place.
A single Pocket PC can manage up to 5 Wed007 and thus become the "conductor" of a network of Wed007 that it can sequentially and remotely query.

1.5.   Major functions

- 2 measurement ranges:
  - 40-120 dB(A)
  - 60-140 dB(A)
- Parallel acoustic measurements:
  - A and C weightings
  - C or Z peaks
- Calculation of "work station" indicators according to the selected configuration:
  - ISO
  - OSHA
- Monitoring of the signal's peak value with respect to 135, 137 and 140 dB thresholds
- Alarm management

  - Exceeded sound level
  - Operating (battery, memory)
- Advanced customisation of calculations, display and storage

  - Bisection parameters 3 and 5
  - Tc: reference time
  - Lc: reference level
  - Lcutoff: limit threshold
  - Integration time
  - Time constant: Fast, Slow and Impulse.
- Possibility to program the measurement in terms of starting date and duration (4 different modes):
  - Immediate
  - Delayed
  - Daily periods
  - Free periods
- Large storage capacity (256 MB Flash memory)
- Long operating life on battery (50 hours)
- "Bluetooth® wireless technology" communication
- Coding of events (3 dedicated keys)
- Oral and/or written comments
- Protection function against accidental stop after erroneous handling
- Self-test function ensuring a quick control of proper operating

1.6.   Calculated magnitudes

1.6.1. Metrological magnitudes

- LXYp: sound pressure level
- LXeq: equivalent continuous level
- LXeq Max Min: maximum/minimum equivalent continuous level
  LXn: statistical sound level
- LUpk: peak level
- Lex,d: noise exposure level
- EA,T: noise exposure level in Pa²h
- Dose
- TWA: time weighted average
- LAVG: average sound level
  - X: A, C frequency weighting
  - Y: S, F, I time weighting
  - U: C, Z frequency weighting

1.6.2. Additional magnitudes

- Measurement time
- Measurement operating life

1.6.3. Alarm indicators

- Overload and underload indicator
- Peak indicator
- Battery indicator

2.   PRESENTATION OF THE WED007 INSTRUMENT

Warning:
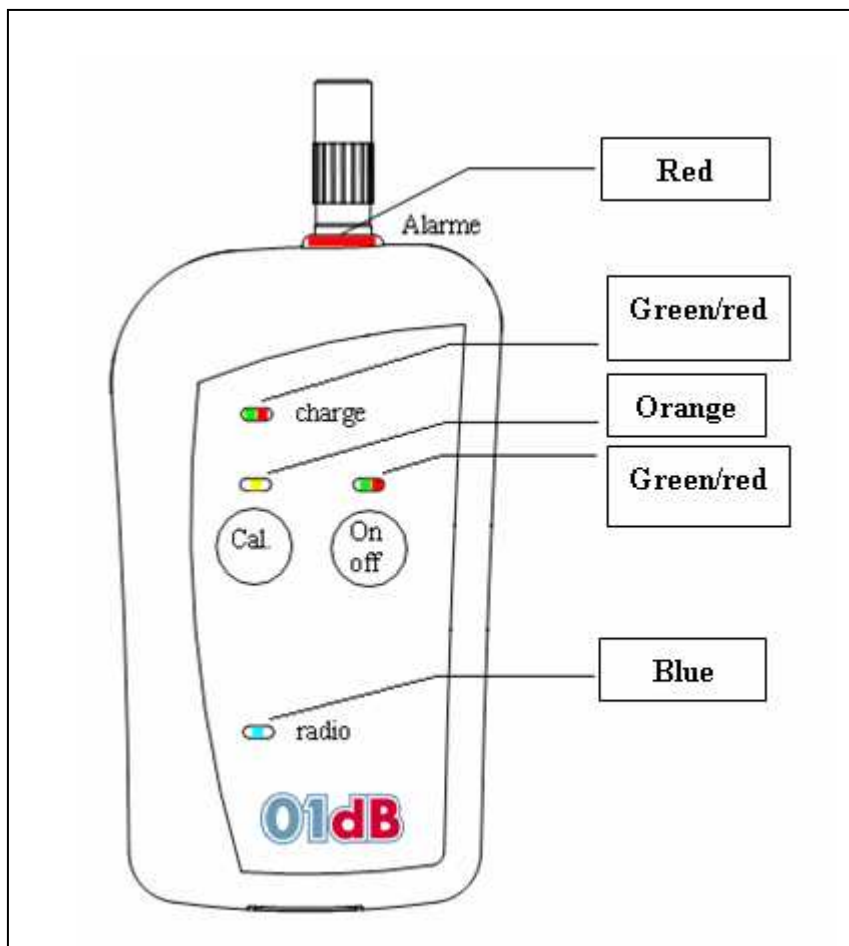«This instrument emits electromagnetism waves; do not use on pacemakers porters».

Alarm LED

Removable microphone

Battery LED

Calibration LED

Measurement LED

On/Off key

Calibration key

Wireless communication LED

Charger connector

Connections

2.1.   Keyboard

The keyboard includes 2 keys used to operate Wed007 in stand-alone mode.

2.1.1. On/Off key

This key can generate several actions depending on the status of the dosimeter:

- Dosimeter "Off": briefly press this key to turn the dosimeter on. The "On/Off" LED is on and green.

- Dosimeter "On": press this key for 5 seconds to start the measurement mode (immediate start) with the current measurement configuration (that stored previously). The LED turns on permanently when pressed, and then blinks rapidly as soon as the measurement starts. During the measurement, the LED blinks every second.

  📖 *If, in the configuration, the LED is deactivated during the measurement, the blinking will stop after 30 seconds.*

- Dosimeter in measurement/storage mode: pressing the On/Off key has no effect if the key has been deactivated. To stop the measurement, get control of the instrument using the Pocket PC or wait for the battery to be discharged or for the measurement to be completed if automatic stop has been programmed.

- Dosimeter in standby mode: press the "Cal" or the "On/Off" key for more than 10 seconds to turn the instrument off.

- Dosimeter in measurement and storage modes (non deactivated key): press the On/Off key for more than 20 seconds to stop the instrument.

- Dosimeter in measurement and storage modes (deactivated key): if for one reason, the cessation of measurement isn't possible, user can stop the instrument by pressing 5 times in a row touch « On/Off » at the same time with blinking of « measurement is underway » LED.

📖   *When the dosimeter is turned off, LED "Cal" and "On" turn red and blink during 5 seconds.*

2.1.2. "Cal" calibration key

Press the "Cal" key for 2 seconds to start the calibration process. The instrument performs the LCeq measurement.
The orange LED blinks during the calibration process and remains on when the calibration is OK (it starts blinking again if the calibration is bad).
Press the Calibration key for 2 seconds to stop the calibration.

📖   *Press both keys for 2 seconds to reactivate the Bluetooth connection during 5 minutes and enable the control of the instrument with a Pocket PC.*

2.2.   LED

There are 4 LED on the front panel providing information on the operating status of the Wed007 dosimeter / exposure meter. Their operating can be disabled by the Pocket PC not to alter the operating life of the instrument.
There is a 5th LED on the upper part of the instrument at the basis of the microphone that informs the individual wearing the dosimeter of a possible threshold violation (overload, dose…).

2.2.1. On/Off LED (Green/Red)

This two-colour green/red LED provides information on the dosimeter status:
- Permanent green: the dosimeter is ON
- Blinking green: the dosimeter is in measurement mode and stores data
- Permanent green: displayed at the end of the measurement and if the measurement is properly completed
- Permanent red: displayed if the measurement is stopped abnormally (full memory)
- Permanent red at start-up: the battery is low or there is not enough memory
- Blinking red: the battery is low during the measurement

2.2.2. Calibration LED (Orange)

This LED is orange and indicates the status of the calibration process:
- The LED blinks slowly while searching for the level for at least 5 seconds.
- The LED blinks quickly for 15 seconds when the level is reached.
- The LED remains on, the calibration correction is stored and applied to the next measurements.

2.2.3. Radio LED (Blue)

This LED is blue and indicates the status of the wireless connection:
- Permanent when the Bluetooth connection is active
- Blinking when activity is detected on the connection.

If the connection is lost:
- An automatic reboot of connection is realised every 14 seconds (the blue LED stops, remains on, then blinks when connection is activated again).

- Press on the 2 keys [image] during 2 seconds to systematically reactivate the Bluetooth link for 5 minutes and allow Wed007 for dBWed software operating.

    The blue LED stops to blink after 30 seconds, if discreet mode is activated in the system parameters of the configuration sent last blue LED stops to blink after 30 seconds, if discreet mode is activated.

2.2.4. Battery LED (Green / Red)

CAUTION: this light indicator is the only one that is not managed by the processor but directly by the charger integrated in dosimeter / exposure meter Wed007. It operates then as soon as the charger is connected to Wed007. It is:
- Permanently green during the charging process (it turns off when the process is completed)
- Red if there is a charging error (defective battery, excessive temperature, low power supply).

2.2.5. Alarm LED (Red)

This red LED is located on top of the housing so that it is visible by the person wearing the dosimeter and can indicate specific noise events:
- Overload on the microphone input signal
- Dose or exceeded programmed threshold.

    Upon start-up, this LED turns on red if the previous measurement has completed abnormally (full memory or low battery).

2.3. Connections

2.3.1. Microphone connector

The microphone connector located on top of the instrument is used for direct connection of the microphone or using the extension cable, depending on the type of use.

2.3.2. Charger connector

This USB connector is only used to recharge the instrument with the battery charger.

2.4.   *Vocabulary / Formulae / Glossary*

2.4.1. *Vocabulary*

Leq: Equivalent continuous level
LAeq: A-weighted equivalent continuous level
LCeq: C-weighted equivalent continuous level
Lp: Sound pressure level
LAFp: A-weighted sound pressure level with the Fast time constant
LASp: A-weighted sound pressure level with the Slow time constant
LAIp: A-weighted sound pressure level with the Impulse time constant
Time constant: Integration time of de dosimeter detector
Fast (F): Fast time constant equal to 125 ms
Slow (S): Slow time constant equal to 1 s
Impulse (I): Impulse time constant equal to 35 ms
LpMax: Maximum sound pressure level
LEX,d: Sound exposure level in dBA
Lpc or Lpeak: Peak pressure level
LCpk: C-weighted peak pressure level
LZpk: Z-weighted peak pressure level
EA,T: Daily noise exposure in Pa²h: sound energy during time T
EA,projected: in Pa²h: sound energy considering that the level measured during time T is identical and representative of the sound phenomenon during reference time Tc
Dose: Noise dose referenced at 85dB (Lc) during 8h (Tc)
Projected dose: Noise dose referenced at 85dB (Lc) during 8h (Tc) considering that the level has remained the same, during Tc, as the level measured during T
Lxx: Statistical indices, Level exceeded during xx% of the measurement time (e.g., L10: Level exceeded during 10% of the measurement time)
TWA: Time weighted average (OSHA noise exposure level, 8h reference)
TWA projected: Time weighted average over Tc considering that the phenomenon has remained comparable with the phenomenon measured during T
LAVG: Global average level calculated taking into account parameter Lcutoff
SEL: Sound Exposure Level (Reference 1s)
Lc: Reference level for the dose calculation dose
Tc: Reference time for the calculation of LEx,d
Lcutoff: Limit threshold level beyond which sound levels are ignored in the calculations
Q: Bisection index, number of decibels to add to the level to increase the auditory risk by 2
Period: Time interval defined by date, starting time and duration
Each period represents a memory record.
Integration time (storage timing): Calculation time for the Leq, time interval between 2 successive storages in the internal memory of the dosimeter.
Overall results: Results calculated over the entire period (Leq, statistical indices…).

2.4.2. Formulae

Leq (dB): A or C equivalent continuous level

$$\text{Leq} = 10 \log\left[1/T \int_0^T 10^{LA/10} \, dt \right]$$

With
T = measurement time
LA (dB) = A-weighted level

Lavg (dB): Equivalent continuous level used with a threshold an a bisection index of 4 or 5

$$Lavg(Q) = q \log\left[\frac{1}{T} \int_0^T 10^{LAx/q} dt \right]$$
$$10^{LA/q} = 0 \; if \; LAx < L_{cutoff}$$

With:
Q = bisection index (4 , 5)
q = Q/log2
Lcutoff (dB) = cutoff level in dB
LAx (dB) = A-weighted level with time constant

Dose (%):

$$D = 100/Tc \int_0^T 10^{(LA-Lc)/q} dt$$

With:
Tc = legal working time (usually 8 hours)
Lc = reference level
Q = bisection index
q = Q/log2
Lc (dB) = reference level
LA (dB) = A-weighted level without or with time constant

Lex,d (dB): Daily noise exposure level:

LEX,8h = Leq,T+10log T/ Tc

With Tc: legal working time, in general 8 hours (Q=3)

EA,T (Pascal²h ....): Noise exposure

$$EA,T = \left[\int_0^T p^2{}_A(t)dt \right] = P_0{}^2*T* \ 10^{LAeq/10}$$

With
P_A: A-weighted sound pressure
T: measurement time
P_0: reference sound pressure = $2 10^{-5}$ Pa
Q: bisection index (Q=3)

TWA (dB): Time Weighted Average

TWA = q * log (D/100) + Lc = Lavg(Q) +q * log (T/Tc)

With
Lavg(Q): equivalent continuous level with threshold and bisection index 4 or 5 and time constant S
T: observation time Tc: legal working time in seconds
Lc: reference level

SEL or LAE (dB): Sound Exposure Level: SEL = $LAeq,T+10log \ T/ \ T_0$

With: T_0= 1s

Lx: Statistical index, Level exceeded during x% of the time

L_{pc}: Peak sound pressure level
$$L_{pc}= 10log \ (p_c/p_0)^2$$
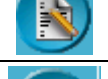
With maximum peak value of the instant sound pressure over the specified time.

135dB, 137dB, 140dB peak counter, overload: These 3 counters are, if the peak level is exceeded, over 135, 137 or 140 dB, respectively. The peak counter is updated at every sample (24K/s).

LAXpMax duration: Time during which he A-weighted sound pressure level with a Fast, Slow or Impulse time constant has exceeded the programmed LAXpMax level (5ms basis).

2.4.3. Glossary

Symbol	Explanation	Symbol	Explanation
	Search for Wed007 on the wireless network		Wed007 unselected
	Visual display of all Wed007 detected by the wireless connection		Wed007 selected
	Access measurement configuration		Read Wed007 measurement configuration
	Access measurement screen		Send measurement configuration to Wed007
	Access notes and comments screen		Activate configuration
	Create configuration		Overload
	Edit configuration		Below range
	Delete configuration		Beyond range
	Remove dosimeter from Workshop space		Wed007 is in storage mode
	Add dosimeter to the Workshop space		Ready for measurement
	Read Wed007 internal clock		Battery indicator
	Send date and time to Wed007 internal clock		Wireless connection quality indicator
	Select folder		Search for Bluetooth instruments
	Oral comment		Show or hide keyboard at the bottom of input screen

	Coding 1, 2 or 3		Validate screen
	Written comment		Exit screen without saving modifications
	Start/Stop		Create folder
	Start Leq Start/Stop		Stop Leq Start/stop
	Save		

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3.   USING WED007 IN STAND-ALONE MODE

3.1.   Presentation

Although Wed007 has been designed to operate coupled with a Pocket PC that acts, among other, as the human-computer interface, it can be used in stand-alone mode. In this case, Wed007 can perform measurements and store them, according to the measurement configuration memorised last.

The 2 keys on the front panel will be used to:

- Calibrate the instrument
- Start the measurement IMMEDIATELY.

Upon power-up, the "On/Off" LED turns green if the instrument does not detect any operating defect. If a problem is detected, the LED turns red, thus indicating that a problem has occurred. The measurement will not start until the problem is solved.
If the "Battery" LED if off, it means that the battery has not reached its recharge threshold and can then not ensure a given measurement time.

3.2.   Calibration of Wed007

Before each measurement, it is recommended that the instrument be calibrated. To do so:

- Place the calibrator on the microphone
- Press the "Calibration" key for 2 seconds: the instrument will start a LCeq measurement.

The LED blinks during the calibration process and remains on when the calibration is OK (it starts blinking again if the calibration is bad).
The LED blinks slowly while searching the level during at least 5 seconds.
The LED blinks quickly during 15 seconds when the level is reached.
The LED remains on; the calibration correction is stored and applied to the next measurements.
Press the calibration key for 2 seconds to stop the calibration process.
The calibration also stops when the time is exceeded by 1 minute.

3.3.   Measurement mode

Press the "On/Off" key for 5 seconds to start the measurement. The instrument stores the values defined in the configuration memorised last, according to the integration time.

The green LED (On/Off) blinks every second, indicating that Wed007 is in the measurement phase.
The measurement is stopped:

- By pressing the "On/Off" key for a long time (5 to 15 seconds)
- By the end of the battery capacity
- By the end of the memory capacity.

When the measurement stop is programmed with the keyboard: the 2 LEDs "Calibration" and "On/Off" blink during 5 seconds (red) before the complete stop of the instrument.
If the instrument stops the measurement further to the detection of low battery capacity or memory, the measurement file is still closed before the instrument shutdown.

3.4.   Data reading mode

In case of stand-alone operating, data must be transferred to the Pocket PC or to a PC for further analysis.
Please refer to the "Using Wed007 with a Pocket PC" section to achieve this procedure.

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4. USING WED007 WITH A POCKET PC

4.1. Presentation

This is the most advanced use of the instrument, which presents unrivalled power and user-friendliness, required for the study of occupational noise.
The management of a set of Wed007 including several workshops is achieved from a single Pocket PC: the user can simultaneously control and operate from 1 to 5 dosimeters / exposure meters Wed007 per workshop.

The Pocket PC can configure all Wed007 in a workshop, then control acoustic indicators in real time on each Wed007 (at most 5 instruments simultaneously).
The Pocket PC represents the single, user-friendly and remote human-computer interface of several dosimeters / exposure meters Wed007.

The different menus of the dBWed software are described below after the presentation of general ergonomics. The management of measurement configurations, the real-time display of measured levels, and the collection of measurement files will be successively addressed.

4.2. General ergonomics

4.2.1. General points

Although the screen structure is optimised for a simple and user-friendly use, standardised ergonomics allows for a rapid feel of the instrument.
The different icons are as universal as possible and direct access to all basic actions is available in each screen. Only access to the specific functions of a given dosimeter among n is achieved through a specific action: press the stylus on the area representing the dosimeter. This is equivalent to the "right click" on the mouse of a PC.

A keyboard is displayed at the bottom of the screens where text input is possible. The operator can enter text using the stylus. Right clicking on the keyboard icon, , will hide or show the keyboard.

In the list of instruments assigned to a workshop (on the right side of the screen), a dosimeter is displayed in a frame and information relative to this instrument are also displayed.

📖   On the virtual keyboard, switching from the alphabetic to the numeric keyboard is achieved by clicking on key .

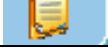### 4.2.2. Menu bar

This bar is displayed in all screens and is used to switch rapidly from one screen to the other.

		Access to workshop management
		Access to measurement and storage set-up of the dosimeter
		Access to real-time display of acoustic indicators
		Access to the Wed007 / Pocket PC data transfer function
		Access to results screen

4.3.   Implementation

After launching the dBWED program, the user searches for the dosimeters present in the wireless

communication range of action using key .

The communication distance is equal to about 10 m in the case of a Pocket PC equipped with class

2 Bluetooth. Icon indicates this activity. At the end of the implementation phase, the workshop management screen is displayed.

4.4.   Workshop management screen

This screen is used to organise the Homogeneous Exposure Groups:

*   Assignment of a name to a workshop when it is created and association of a brief description
*   Deletion of a workshop from the list
*   Assignment of 1 to 5 dosimeters / exposure meters Wed007 to the workshop
*   Deletion of one or several Wed007 from the workshop
*   Reading of the date and time of a Wed007
*   Date and time setting for all Wed007 instruments in the workshop

In the left part of the screen, the operator can see the list of dosimeters that he/she can assign to the workshop, and in the right part, dosimeters that are already assigned.
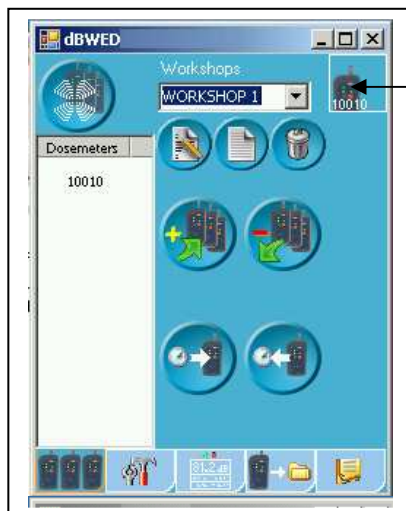
Dosimeter 10010 is assigned to Workshop #1 LEDs on the front facade of the instrument are reported in the icon. They inform users on the state of Wed007

4.4.1. Creating / Editing / Deleting a workshop

Click on the creation icon to create a new workshop. An input keyboard is available at the bottom of the screen. The operator can type in the name of the workshop and associate a comment, e.g., a technical description.

This keyboard is also available when an existing workshop is edited using the icon. When the input or the modification is achieved, the operator selects the validation icon. To quit this screen without changing displayed information, one just needs to select the "Cancel" icon.

To remove a workshop from the list, the operator displays it in the "Workshop name" window and

then selects the trash icon . In order to avoid any error, the user will be systematically prompted for confirmation.

 *Creation, editing, deletion procedures are the same for all screens (workshop, configuration).*

### 4.4.2. Assigning / Removing a Wed007 to/from a workshop

After selecting a dosimeter in the list on the left (click on the Wed007 serial number to select it), the operator can assign the instrument to a workshop as follows:

Selection of icon [icon] results in the transfer of the dosimeter selected in the list on the left to the workshop, the name of which is displayed (list on the top right of the screen).
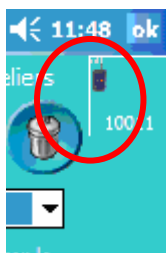
Selection of icon [icon] removes the dosimeter selected in the workshop and places it in the list on the left. Wed007 is no longer displayed in the upper right corner of the screen.
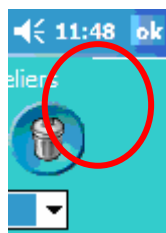
4.4.3. Reading / Writing date and time

At any time, the operator can read the date and time of the selected Wed007 dosimeter / exposure meter, marked with icon [icon] by clicking on icon [icon].

Before starting a measurement, the operator can also send the date and time of the Pocket PC to all dosimeters by clicking on icon [icon].

4.5. Configuration management screen

The configuration of Wed007 instruments assigned to the workshop is achieved from this screen using icon [icon].

Parameters selected by the operator are then transferred to one or several dosimeters. The user can also retrieve the internal configuration of a selected dosimeter.

The user can create, edit or delete 3 types of configurations:

- The measurement configuration
- The start-up configuration
- The system configuration.

📖   *Editing, creation, deletion icons achieve the same functions as those of the Workshop screen.*

4.5.1. Measurement configuration screen
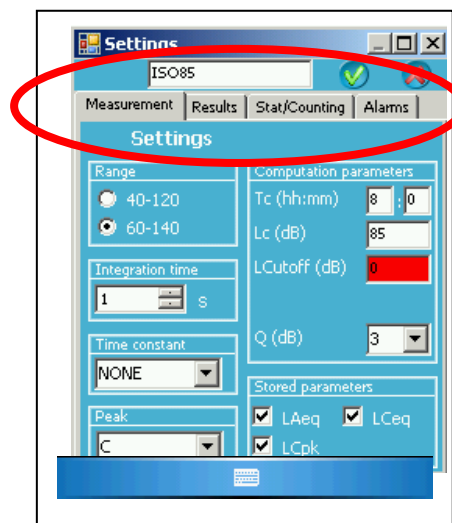
This "Measurement configuration" screen includes several tabs:

- The metrological configuration of the measurement
- The configuration of displayed and stored overall results
- The configuration of statistical indices and of peak counting (LXpmax)
- The configuration of alarms.

4.5.1.1. Metrological configuration of the measurement

This configuration of the metrological parameters of the instrument allows selecting:

- The measurement range
- The integration time
- The time constant
- The peak channel weighting
- Tc, the standardised working time
- Lc, the reference level used to reference the dose: a level of 85dB during 8h gives a dose of 100%.
- Lcutoff, the cutoff level below which acquired levels are ignored in the calculations*
- The decision threshold level of LXpMax*
- Q, the bisection parameter
- Indicators to calculate and store after each integration time

  Time constant, Lcutoff and LXpMax parameters are only used in Anglo-Saxon standards.

  If the user chooses a specific time constant, noise level take into account these parameters.

  The extent of the measurement range of the peak channel is equal to 93-143 dB.

  The A-weighted standardised sound level Leq (LAeq), the C-weighted sound level (LCeq) is used to select hearing protections according to Standard ISO 4869-2.

  If the keyboard hides the bottom of the tables, the user can click on the keyboard icon [⌨] so that the keyboard is reduced and that the "Peak" and "Measured magnitudes" functions and the "Measurement - Results - Statistics/Counting – Alarms" menu are visible.

4.5.1.2. Configuration of overall measurement results

This part of the measurement configuration allows the operator selecting only overall results that he/she really wants to display and stored.
LAVG, TWA results are used in Anglo-Saxon regulations and they will not be checked if they are used with regulations that do not mention them.
This configuration is confirmed by clicking on the validation icon.
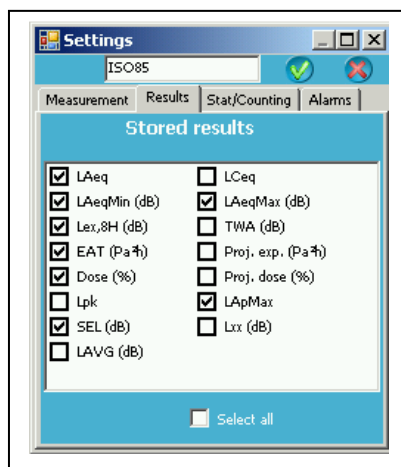
At the end of the measurement, only indicators that are checked will be displayed and stored in the Pocket PC as a text file.

4.5.1.3. Configuration of statistical indices and peak counting

The user can opt to calculate and store statistical indices by checking 1 to 5 boxes and defining the values of these statistical indices from 1 to 99%. Indicator L10 represents the sound level exceeded during 10% of the measurement time.
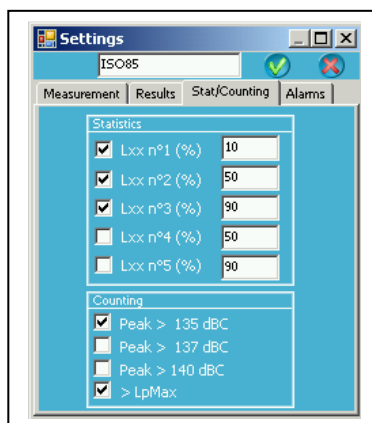
The user can also opt to count 135, 137 and/or 140dB peak violations and calculate the time during which LXp (sound pressure level) was greater than xxx dB.

4.5.1.4. Configuration of alarms

Wed007 can trigger a light signal on its upper part (at the basis of the microphone) if one of the conditions listed in the screen below is fulfilled.

If the operator does not want to apply any alarm condition, he/she just need to select "never".
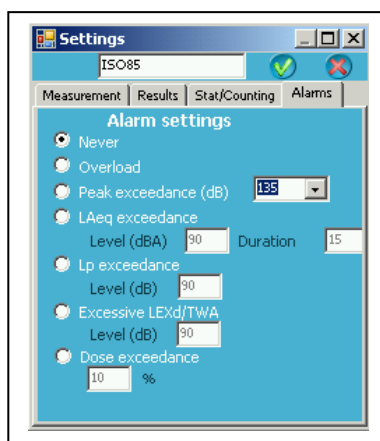
The different triggering selections are as follows:

- overload: as soon as the pressure signal is off the measurement chain characteristics, Wed007 reports it by activating the corresponding LED
- peak violation: xxxdB: as soon as level xxx is exceeded on the peak channel, the alarm LED is activated
- LAeq violation: the operator can request the activation of the LED when, for instance, Leq 15min exceeds 85dB
- LXp violation: the operator can request the activation of the LED when the pressure level exceeds a specific value
- violation of the daily exposure level (or of TWA)
- violation of a set value of the dose

This alarm can be used to:

- Warn the individual wearing Wed007 of the need to wear hearing protections (ear plugs, headphones) because he/she enters a noisy area.
- Allow the occupational physician to remove a worker from the noisy area because his/her authorised dose has been reached.

4.5.2. Start-up configuration screen

In this part of the configuration, the user programs the name of the configuration, the date and time of the measurement start and the measurement duration. Four types of starts are available depending on the selected strategy:

- Immediate start of the measurement
- Delayed start
- Daily repetition of a measurement type
- Programming of measurement periods

    Whatever the selected type of start, the user must give it a name using the virtual keyboard. This name will be used to find the selected configuration among all stored start-up configurations.

    The virtual keyboard is shown or hidden by clicking on the corresponding icon at the bottom of the screen.

4.5.2.1. Immediate start

In this operating mode, the measurement starts as soon as the measurement activation command is sent to the Wed007 dosimeter / exposure meter.
After the global configuration is completed the user sends the order to activate this function and the Wed007 instrument immediately starts recording data according to the received configuration.

Keyboard icon
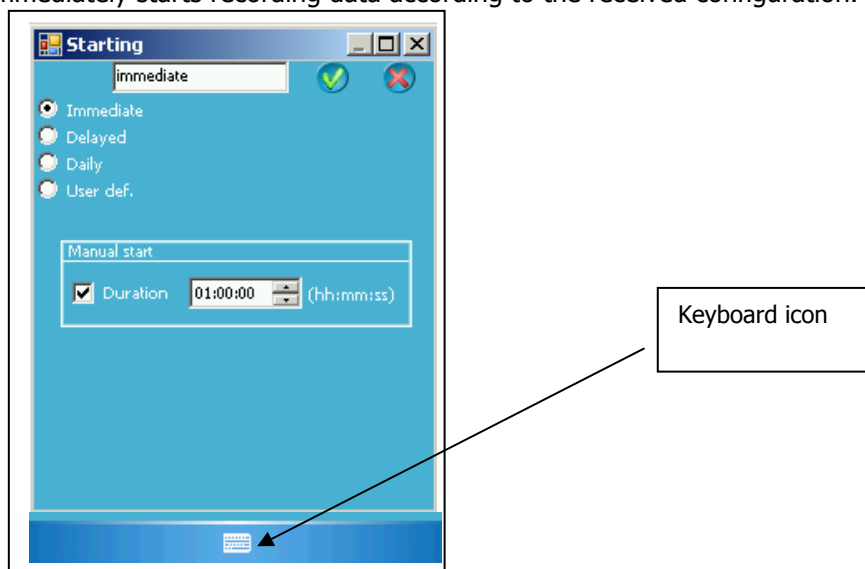
In this case, programming comes down to selecting the measurement duration, if the operator wishes that the systems automatically stops recording after a specific time period. After entering the configuration name using the virtual keyboard, the user must check the "duration" box and enter the duration clicking on arrows ⬆⬇, when the cursor is placed on the hours, minutes or seconds fields. The value of each field can also be entered from the keyboard.
If the "duration" box is not checked, the dosimeter will keep recording results until the battery is empty or until the memory is full or until the user stops the instrument (see shutdown procedure using the Pocket PC).

The configuration is validated by clicking on icon [icon].

4.5.2.2. Delayed start

If he/she wishes so, the operator can set the instrument ahead of time. This way, he/she can program a date and time for a measurement to be carried out, for instance, on the next day. Once the programming is validated, the dosimeter will be in standby mode until the programmed date and time. Like for the immediate start, the operator can opt to stop the procedure after a defined measurement time.

To program this start mode, the user must enter:

- The configuration name
- The date and time of the measurement start. To do so, he/she must successively select the different fields for start date and time and modify them using either the arrows, or the keyboard.
- The measurement duration using the same input procedure.

The configuration is validated by clicking on validation icon [icon].

📖   *After 5 minutes, the dosimeter is set in standby mode by automatic setting on the Stop position. It can be restarted by pressing the On/Off key.*

📖   *No power is consumed during the standby phase.*

4.5.2.3. Daily programming

This programming mode is an extension of the previous mode. The operator can, for instance, schedule and program one week of measurements in a single operation. To do so, he/she just needs to enter the configuration name and the 3 following measurement parameters:

- The date and time of the measurement start
- The measurement length
- The number of days during which the measurement must be carried out.

If, for instance, the user must monitor a work station for one week, from 7:00 AM to 5:00 PM, he/she just needs to program the date and time when to start the monitoring, and length of 10 hours for 5 days.

Under these conditions, Wed007 will start a measurement at the programmed date and time during 10 hours. Then, it will go into standby mode until the next day, when it will restart a 10-hour measurement at the same time as the day before. The cycle will repeat during 5 days.

4.5.2.4. Free programming

This is the most flexible mode of all, as it allows the user splitting the overall measurement into 10 periods with different lengths, each starting at an arbitrary data and time.

To do so, he/she must enter, using either the keyboard, or the ▲▼ arrows, the dates and times and the respective lengths of each measurement period.
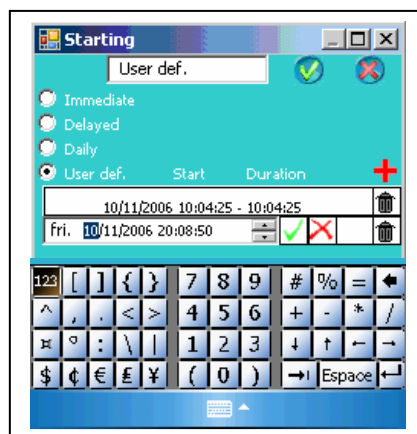
The input protocol is the same as that described before. However an additional concept is available: addition or deletion of periods, using icons ✚ and 🗑. Once the characteristics of a measurement period are entered and validated, clicking on icon ✚ will display a new "date, time, duration" line for input of the parameters of the new period. A period can be deleted by clicking on icon 🗑.

    When the number of periods, which is limited to 10, is reached, icon ✚ is no longer displayed.

4.5.3. System configuration screen
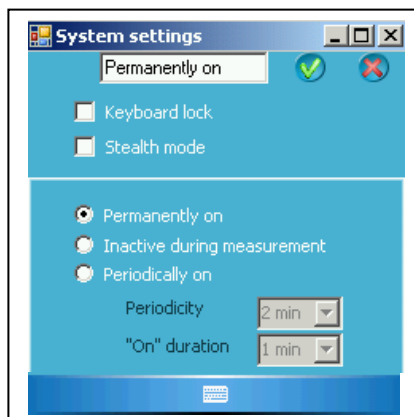
4.5.3.1. System parameters

Keyboard locking is an easy and efficient way to prevent the person wearing the dosimeter from stopping the measurement. The user can disable the use of the keyboard by checking this box.
In order to increase the measurement autonomy and/or to make the dosimeter as unobtrusive as possible for the bearer, LED activity can be disabled by selecting the "discreet mode".
The diode indicating by its blinking that Wed007 is in measurement mode is inhibited. Nothing makes the dosimeter different of an operating Wed007. Pressing on any key will reactivate the measurement indicator for a few seconds.

    📖   *The alarm LED is not concerned by the discreet mode. The user can disable it by checking the "never" box in the "alarms" configuration screen.*

4.5.3.2. Bluetooth wireless communication

There are several ways to manage the Bluetooth communication in order to save energy:

- The connection is still active. In this case, the Pocket PC can act on the dosimeter and display acoustic indicators.
- The connection is "deactivated during the measurement": the Pocket PC can no longer have access to the Wed007. One must act on the dosimeter to momentarily reactivate the connection.
- The activity can be made periodic; it is reactivated for a programmed length and this, at regular intervals.

    📖   *When the activity of the wireless connection is periodic, it can be difficult to restore contact with Wed007 according to the programming of frequency and duration parameters.*

    📖   *When it is on, the "Bluetooth" LED indicates that the connection is available, whereas when it blinks, it means that the connection is active.*

    📖   *However, even if the keyboard is locked and the wireless communication disabled, pressing the two keyboard keys allows for momentary (during 5 minutes) reactivation of the Bluetooth connection. It is thus possible to access measurement data and check the battery status.*
The user can also stop the measurement "suddenly" using the Pocket PC.

4.6. Measurement mode

When the operator has completed the configuration of dosimeter / exposure meter Wed007, he/she must send it to all instruments in the workshop. On the general configuration screen,

he/she selects the "Send configuration" icon: .

Each dosimeter in the workshop, i.e., displayed in the right part of the screen, receives this configuration and, in return, sends the date and time scheduled for the end of the measurement to the Pocket PC.
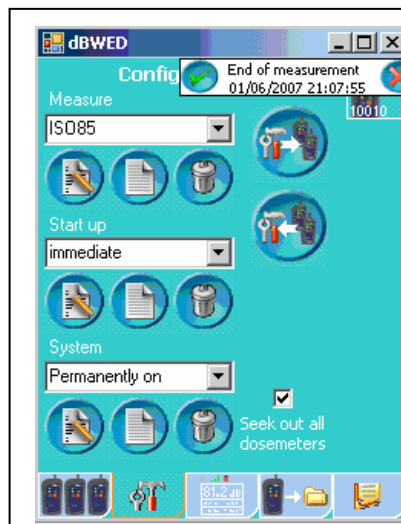

Reading this information, the operator can start activating the measurement or correct its configuration or recharge the Wed007 battery, if the expected duration is not suitable.

To consult the configuration of a Wed007, the user selects the icon . He modifies then the desired parameters and returns the modified configuration.

    The end date and time scheduled by Wed007 take into account the battery and memory capacity.

Once the end date and time are validated on a dosimeter, a "configuration activation" icon is displayed. The operator validate or not this information for each dosimeter.

Clicking on icon will activate one or all Wed007 present in the workshop, according to the
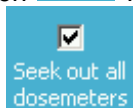
status of field .

As soon as the measurement has effectively started on the Wed007 dosimeter (immediate starting mode), the green LED on the dosimeter blinks once per second to indicate this status. It turns off after one minute if the "discreet" mode has been selected in the system configuration.

In case the start configuration requires a delayed start for the recording, the green LED turns off after a few minutes; the dosimeter goes in stop mode until it is "awaken" by the internal real-time clock. The measurement LED is reactivated only when the instrument "wakes up".

4.6.1. Measurement screen

During the measurement and provided the wireless connection configuration allows for it, the user can:

- View results in real time on the Pocket PC screen
- Code specific events
- Record oral or written comments
- Launch a start/stop measurement without disturbing the measurement in progress.

To do so, activate the « measurement » tab: .

4.6.1.1. Visual display of measurement results

The results screen display the results and the status of the selected Wed007.
To select a Wed007 instrument, click on the icon representing it on the right of the screen. A frame surrounds the active Wed007.

The Measurement screen includes several "sub-screens":

- The upper part or status area
- The centre part of results area
- The lower part including the command area
- The bottom part of the screen is always devoted to the navigation between major screens
- The right part of the screen displays all Wed007 dosimeters present in the workshop.

Depending on the configuration, displayed results are different. In any event, the operating principle is the same: clicking in one of the areas allows displaying the different results of this area sequentially.

4.6.1.1.1. Status area

This section displays information relative to the instrument selected in the right part of the screen:

- Measurement/standby mode:

Animated icon represents a dosimeter in measurement phase, whereas icon represents a dosimeter waiting to be started
- Battery status of Wed007
- Bluetooth reception level

4.6.1.1.2. Results area

The results area consists of 3 zones:

- The Leq zone
- The peak level zone
- The overall "levels" (Dose, EA,T,…) zone corresponding to the displayed measurement duration.

The operator can read the A-weighted or C-weighted Leq equivalent level by clicking on this zone.
In the peak level zone, the C-weighted or Z-weighted peak level can be read, depending on the parameter selected in the measurement configuration.
In the "overall results" area, the monitoring results for the work station related to the measurement duration: LEX,d, (TWA), Dose, sound energy.

4.6.1.1.3. Commands area

This area contains icons that the operator can use to enrich his/her measurement file. Wed007 records LAeq, LCeq, Lpk samples every integration time. In order to mention the occurrence of a specific noise event in the measurement file, the operator can use one of the following icons:

- coding
- oral comment
- written comment .

He/she can also combine these 3 tools.
At the beginning of the specific noise event, one must click on one of the coding icons, which will tag all data recorded from this moment. They are assigned the selected code.
At the end, an oral comment can indicate that this specific noise corresponds to a defined event. A written comment input through the virtual keyboard can also indicate that code1 corresponds to a given event.

In this way, when the file is later processed, all elements will be available to interpret the results.

Using the Leq Start/Stop function, it is also possible to apprehend the sound level of a specific noise source. To do so, as soon as this source occurs, the operator triggers the LAeq calculation using icon and stops it by clicking on icon as soon as the source stops.
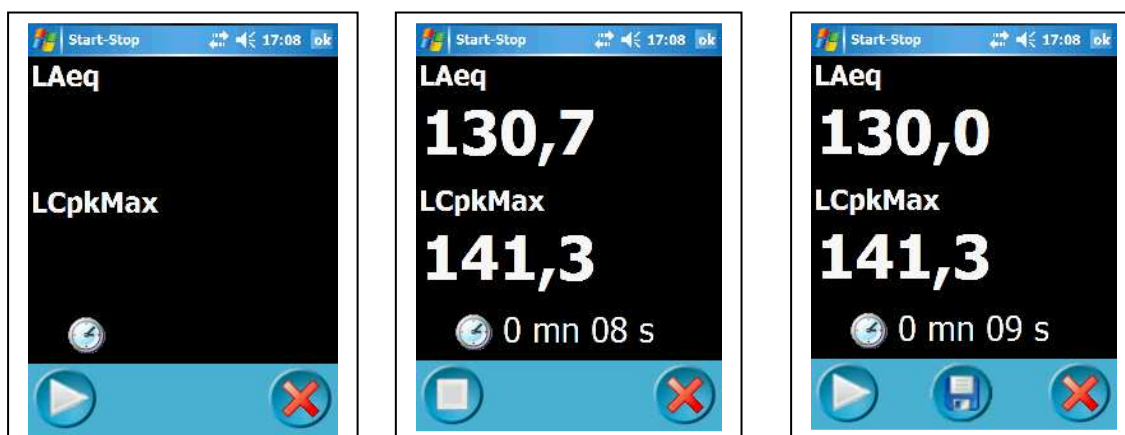
The operator will then knows the LAeq sound level, its LCpkMax max peak level and the duration of the event, which is recorded using icon .

4.7. Stop measurement

Depending on the configuration, the measurement is stopped either automatically or manually.
Even if the date and time of measurement stop have been programmed, the user can stop the instrument manually.

There are several ways to do so:

- Stop measurement using the instrument keyboard provided it has not been disabled. Press the keyboard for a long time (15s) to stop the measurement.
- Stop measurement using a Pocket PC command. Right click on the dosimeter to stop to display a command window devoted to the corresponding Wed007.
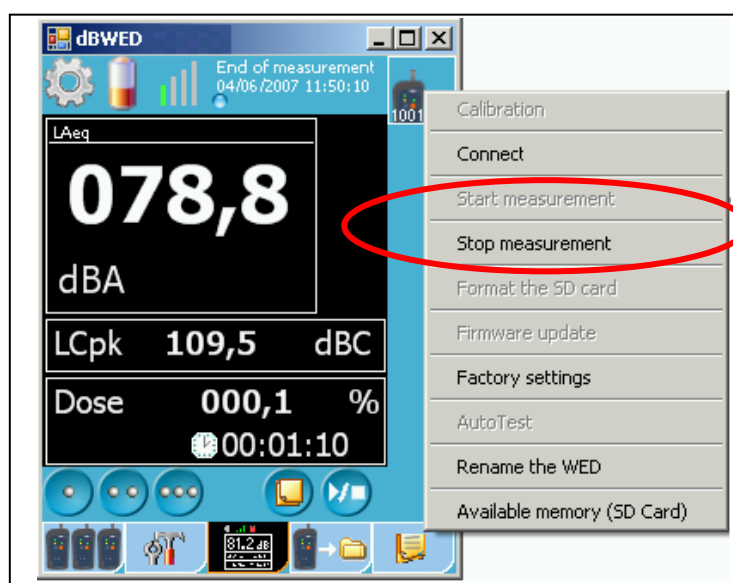
Selecting the "Stop measurement" option will stop the measurement. On the Wed007, the « Measurement » LED freezes and then after 5 minutes, the « Cal » and « Measurement » LED blink for a few seconds and the Wed007 turns off. On the Pocket PC, the screen shown below is displayed listing all overall results programmed in the configuration.

The following information is displayed, depending on the configuration:

- Dosimeter number
- Date, time and time length of the measurement
- Results relative to the A-weighting filter
- Result relative to the C-weighting
- Maximum peak value
- All counters

The counters represent the number of samples (24 kHz) exceeding specific 135, 137 and/or 140 dB levels, overloads, etc.

The "alarm" counter reflects the number of alarm triggers. There is a specific aspect to this counter, if the alarm deals with LEx,d or with the dose: it is obvious that when the alarm level has been exceeded once this status goes on until the end of the measurement. This can be explained since these 2 values can only increase with time.

4.8.   File transfer / deletion

📖   *Filenames are built as follows: "MonthDay_HourMinuteSecond.BIL". For instance, the name: 0405_102909.BIL means that this file was created on 0405, i.e., on April 5, at 102909, i.e., 10:29:09.*

4.8.1. Transfer

Once the measurement has stopped, the user can transfer the list of files stored in the different Wed007 and then retrieve the time data of each file and store them in a folder of Pocket PC.

To this aim, he/she must select the Wed007, the contents of which he/she wishes to know, then

click on icon . This results in the reading and display of the file list (measurement periods) contained in the internal memory of the dosimeter.
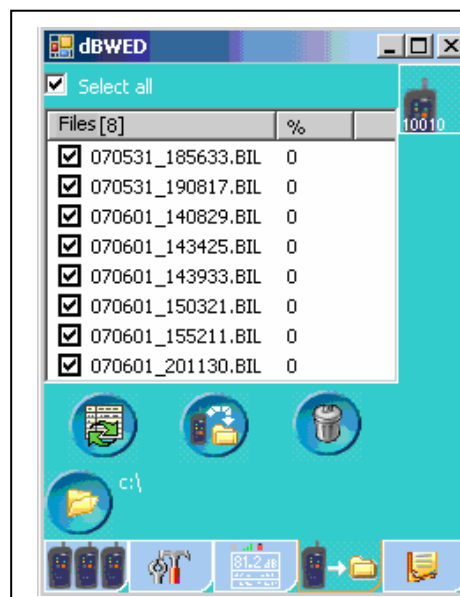
All files are checked in the case of a global transfer. If the operator wants to transfer only one file, he should uncheck all files by clicking on the "Select all" box and then by checking the box corresponding to the selected file. Data are archived in the folder indicated at the bottom of the screen. The operator can create or change the storage folder by clicking on icon .
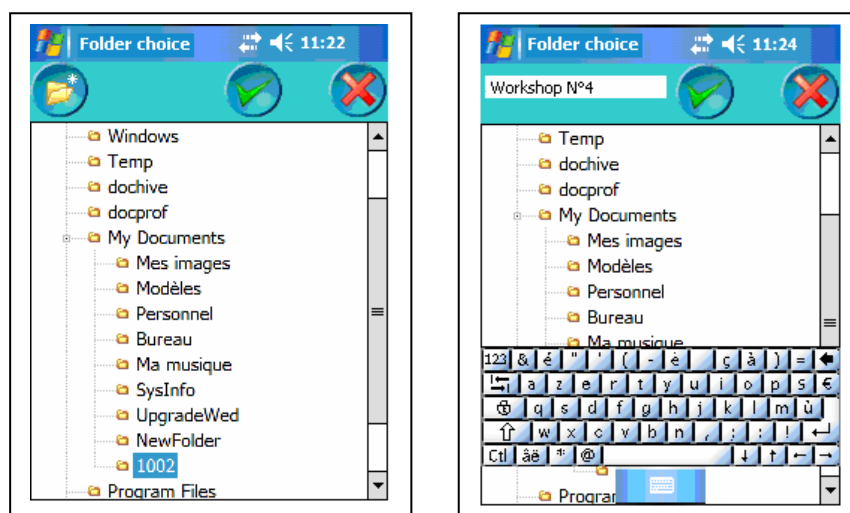
By default, files are stored in folder "My Documents\1002 ». To create a new folder, click on icon

. This will open a new window, in which the virtual keyboard will be used to enter the name of

the storage folder in the "New folder" field on the left top of the screen. Validate by clicking on .

Once the storage folder is selected, click on icon to transfer and store files in this folder.
The progress of the file transfer is displayed on the right of the filename through the percent of
recorded data.

   📖   *The user should preferably avoid stopping a transfer in progress.*

4.8.2. Deletion

Once data are transferred and stored on the Pocket PC, the operator can delete the Wed007 internal
memory. This deletion can be performed in a global way or by selecting files to delete.
Like for file transfer, check the "Select all" box for a complete deletion or check only the boxes of files
to delete.

Click then on icon to really delete the files from the dosimeter memory.

4.9.   Consulting data stored on the Pocket PC

By selecting this tab, the user can consult overall results and additional files containing associated oral
or written comments. He/she can also access Leq Start/Stop results that may have been stored during
the measurement.

   📖   *Additional files associated to the main overall results file are not required. These files, which are*
        created during the measurement, imply, at least momentarily, that the operator is present.
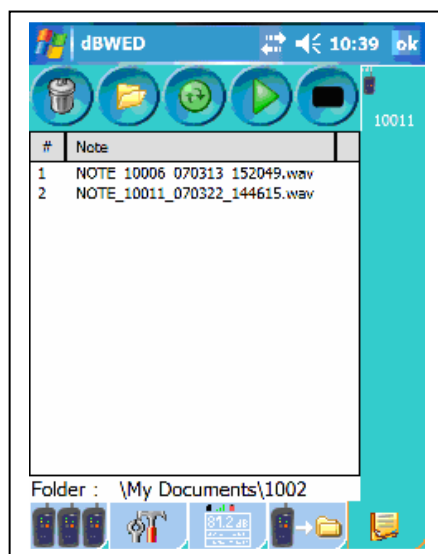
This screen is used to display overall results for each stored period, associated text files, as well as to listen to oral files (*.wav).

To do so, select the storage folder, if different of that indicated at the bottom of the screen, by

clicking on and then select a file and start reading: .

While reading an audio comment file (*.wav), clicking on icon will trigger a pause in the reading.

4.10. Additional functions

These functions are devoted to the selected Wed007 dosimeter / exposure meter. They are available through extended pointing on the Wed007.
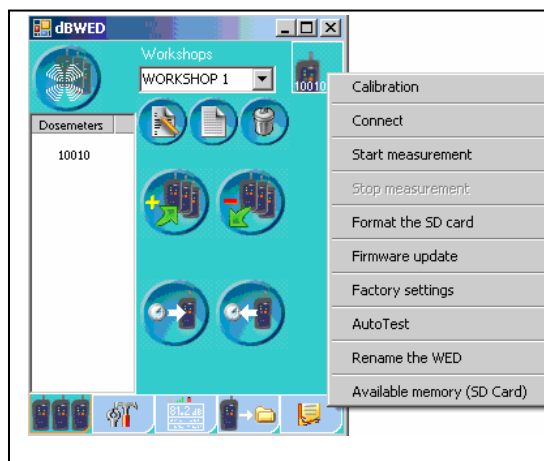
These are functions, such as:

- Calibration of Wed007
- The Connect function
- Immediate start of the measurement
- Measurement stop
- Formatting of SDCard memory
- Update of the Wed007 internal firmware
- Reading of the factory configuration
- Realisation of an self test
- The rename function
- Controlling memory space

4.10.1. Calibration of Wed007

This function can be used to launch the Wed007 calibration from the Pocket PC.

- Set the calibrator on the microphone,
- Click on Calibration,
- Enter the value of the "94dB" reference value of the calibrator

- Start calibration by clicking on ▶.

The behaviour of the Wed007 is similar to that obtained during the manual calibration:
The "Cal" LED blinks during the calibration stays on when the calibration is OK (it starts blinking again if the calibration results are bad).
The LED blinks slowly while searching for the level for at least 5 seconds.
The LED blinks quickly during 15 seconds when the level is reached.
The LED remains on; the calibration correction is stored and applied to the following measurements.
The calibration process also stops when the time is exceeded by 1 minute.

During the search for the stabilised level, the LCeq level is displayed without any correction. Once the value is stable, the LCeq level "freezes" and must be equal to the reference level.
The "Calibration correction" line shows the correction, which must range from +2 dB to -2dB.
When the LCeq level is different of the reference level value, the correction value is equal to + or − 2dB, which indicates a problem on the microphone.

The date of the latest calibration is indicated on this screen and a calibration history is available as a "CalHisto_xxxxx.xml" file, where "xxxxx" represents the Wed007 number.

When the calibration operation is completed, the operator must validate the screen with icon ![icon], or quit without saving changes by clicking on ![icon].

   📖   *It is recommended that the instrument be calibrated before and after each measurement.*

   📖   *If in screen 1, icon ![icon] is displayed, it means that the Pocket PC is searching for the connection with the Wed007. If this situation goes on, quit the window, then the software and restart it. Check that you can read the clock.*

4.10.2. The "Connect" function

This function is used to force the connection between Wed007 and the Pocket PC. By default, the communication between Wed007 and the Pocket PC is sequential. In case the Wed007 instrument connected most recently is stopped, the user must force the connection to gain access to other Wed007 instruments. In the context menu, he/she will thus select the "Connect" function after selecting the proper instrument (one at a time).

« Radio » LED (front face of the Wed007) inform on the connexion activity. It is reported on the icon.
- black: initial state
- orange: test of connexion
- grey: waiting before a new test of connexion
- blue: established connexion
- red: connexion fall. Manual connexion is required in order to log in.

   📖   *If the user is sure that all instruments are operating, he/she can reactivate the communication by requesting, e.g., the display of time.*

4.10.3. Immediate start of the measurement

The measurement is started on the selected Wed007 instrument. The instrument configuration is that sent previously. For more information, please refer to Paragraph 4.6, "Measurement mode".

4.10.4. Measurement stop

To stop the measurement on the Wed007, please refer to Paragraph 4.7. "Measurement stop".

4.10.5. Formatting of the SDCard memory

The deletion of the files will delete the data from the SDCard. It may occur that the alteration of a file blocks the proper progress of the reading or storage functions. In this case, memory restructuring is required to restore proper operating.
Executing the "Format SDCard" function will perform this action.

4.10.6. Firmware update

Further to an upgrade of the software, the internal software (or firmware) may be changed using the "Update firmware" function. The operator must first copy the updating file in the reference folder and then run it.
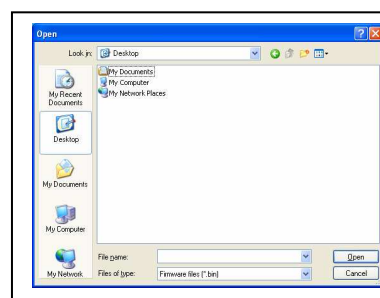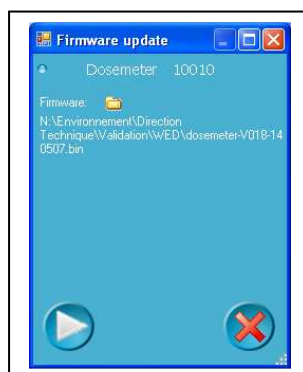
Select the "dosimeter" file to upload by clicking on icon 📁 and the selecting the file.

Click on icon ▶ to start uploading the new executable file in the Wed007. Make sure the power supply is not interrupted during the operation.

When the file is loaded, diode "Cal" blinks for a moment, then the dosimeter turns off. The version upload is completed.
If an error occurs during the process, restart the uploading procedure.
Quit the screen by clicking on the "Cancel" icon.

📖 *Contact Technical Support before performing this operation, if the provided procedure is not clear enough.*

📖 *Firmware update procedure is realised unit after unit. The first Wed007 to be updated is affected to a specific workshop, then it is updated according to the described procedure. Remove updated Wed007, from the workshop and place the second Wed007 to be updated and so on, for all concerned instrument.*

4.10.7. Factory configuration

This function is used to know the intrinsic characteristics of Wed007.
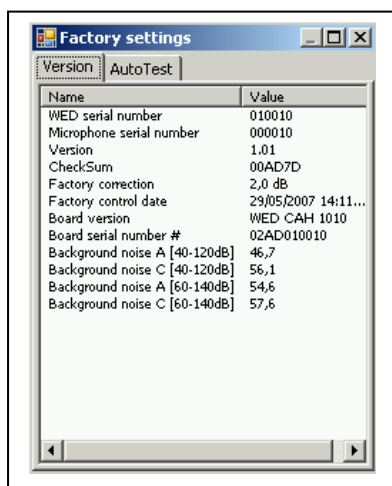
- Wed007 serial number
- Microphone serial number
- Firmware version
- Firmware checksum
- Factory calibration correction
- Date of latest self-test
- Version of the electronic card
- Characteristics of background noise in A and C weighting on the 2 measurement ranges

This information can help the operator to detect possible problems on the microphone and the hotline to issue a preliminary diagnosis.

4.10.8. Self-test

This function is used to assess the metrological validity of the instrument.

  📖 *In order to perform the self-test, the microphone must be present on the dosimeter, with or without an extension cable.*
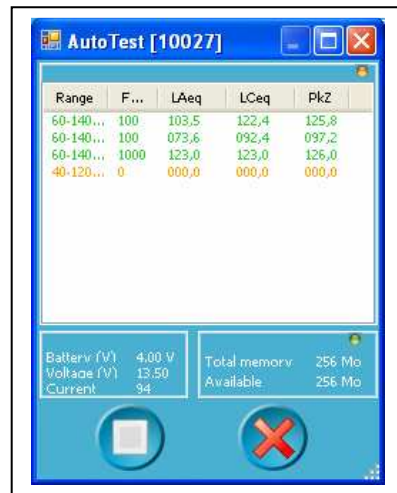 📖 *Caution: the self-test deletes all data present in the Wed007 memory. Back up all data prior to starting the test.*
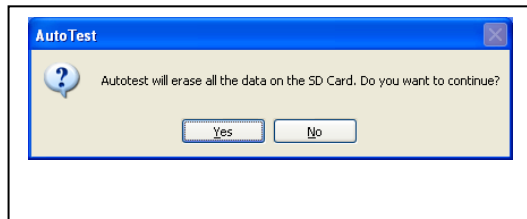
The following tests are performed:

- verification of A and C-weighting curves in 3 points: 100 Hz, 1 kHz, 8 kHz
- verification of the peak channel in Z-weighting
- verification of linearity (30dB)
- measurement of the internal battery voltage
- measurement of the voltage of the analogue part
- measurement of the consumed current
- formatting and control of the memory size

The results of these tests are displayed in green when the test is OK and in red if tolerances are exceeded.

4.10.9.The "Rename" function

This function is used to rename instruments. It is easier to keep track of the instruments and monitor acquisitions remotely if the Wed007 instruments are named explicitly using the name of the concerned individual or station. In this case, the selected name replaces the serial number displayed on screen.

4.10.10. Controlling memory space

The memory available on the SDCard is indicated on the screen after selection of this function.
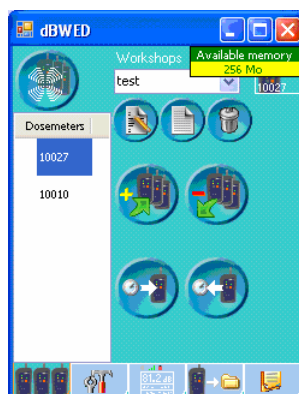
5.   USING WED007 WITH A PC

The PC application is very similar to the previously described Pocket PC application. The dBWed human-computer interface is the same as the Pocket PC de dBWed interface. All functions are the same for the 2 applications. The only differences deal with the implementation of the application on the PC and the user interaction through the keyboard.

5.1.   Bluetooth communication

The operator must check that the Bluetooth peripheral device installed on the PC is of the Bluetooth radio type (default Windows peripheral device). In the opposite case, the existing device must be uninstalled while making sure that it is not used elsewhere. Then the default Windows peripheral device must be installed.

If there is no built-in Bluetooth device, an external Bluetooth key can be connected, which will be automatically detected by the computer.

Turn the Wed007 on by pressing the On/Off key: .

5.2.   Launching software dBWed on the PC

When the application is started, the PC-version dBWed human-computer interface is displayed: it is exactly the same as the Pocket PC-version dBWed interface. The functions are also the same.
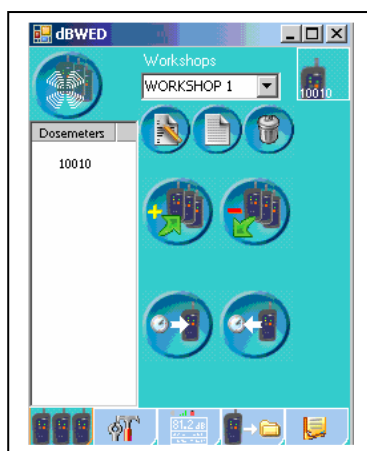
In screens where text input is possible, the operator can type in text using the PC keyboard (there is no keyboard icon that can be activated with a stylus).

5.3.   Implementation

As previously, the search for the dosimeters present in the range of action of the wireless

communication is launched from icon .

Once again this distance is equal to about 10 meters in the case of a PC equipped with class 2 Bluetooth.
For a description of all functions, please refer to the previous chapter "4. Using Wed007 with a Pocket PC".

6.   DBWED SYSTEM ERROR

dBWed may display alarms generated by WED007 in a more or less explicit way. Errors are numbered and interpreted or not, depending on their relevance with respect to the operator. Some of them are system errors that are only meant to inform the operator of a major dysfunction and to provide him/her with information to communicate to the hotline.

Number	Machine name	Operator correspondence	Notes
1	ALARM_LOW_BAT	Low battery	
2	ALARM_MEMORY_FULL	Full memory	
4	ALARM _FAILURE_END_MEASURE	Measurement stop error	Measurement stopped before scheduled time
8	ALARM_SYSTEM_CMX	CMX problem	System problem, real-time core
16	ALARM_PB_MEASURE	Measurement problem: cannot stop real time	The measurement task does not take into account the "stop measurement" command
32	ALARM_QUEUE_ FULL	Writing file between measurement and storage is full	
64	ALARM_PB_CODEC	Codec problem: no samples received	
128	ALARM_FAILURE_READ_CONFIG_AT_ START	Error while reading configuration	Failure while reading a configuration file on SD card or flash memory at start-up
252	ERR_SENDDATABLOCK	Error while sending data	Occurs while uploading a new version
253	ERR_STARTUPGRADE	Downloading cannot start	Occurs while uploading a new version
254	ERR_OPENFILE	Problem opening file	Occurs while uploading a new version
255	ERR_UNDEF	Generic error	During upload
256	ALARM_CONFLIT_SDCARD_CODEC	SDCARD codec conflict for SPI access	
512	ALARM_COM_BOARD_TEST	Communication problem with test card	
1024	ALARM_VERY_LOW_BAT	Very low battery alarm	
2048	ALARM_SUPPLY_CONSO	Alarm for battery problem or analogue voltage or power consumption	

7. MAINTENANCE

No specific maintenance is required.
Before performing a series of test, the user must make sure that the battery is properly charged and, if need be, recharge it.
A regular self-test is recommended to check the proper operating of the instrument.

7.1. Battery charge

When the battery is low, the ON light turns red, meaning that the battery must be recharged.
Also, if, when a measurement configuration is sent, the date and time for the measurement end do not correspond to the expected information and there is enough memory available, it means that the battery needs to be recharged.

To do so, connect the Wed007 to the charger base. The battery LED turns red upon connection, then green, indicating that the charging process has started and runs properly.
After 3 hours, the charging procedure is completed and the battery LED is off, meaning that the battery is properly charged.

    If the battery is already charged when the charger is connected, the LED switches from red to green and then turns off after a few minutes.

    If the light remains red, it means that a problem occurred during the battery charging operation. The battery may be abnormally discharged and then cannot be recharged, or the charging voltage must be too low, or there must be excessive heating of the battery.
It is strongly advised that the After-Sales department be contacted.

7.2. Self-Test

Please refer to Chapter 4.10.8 "Self-test".

8.   TECHNICAL CHARACTERISTICS

8.1.   Standards

NF EN 61252 (2002) / IEC CEI 61252 (2002) / ANSI 1.25 (1991) / IEC CEI 61672 (2002)
ETSI EN 300 328 V1.5.1 (2004)
NF EN 61000-6-1 NF EN 61000-6-2 NF EN 61000-6-3 NF EN 61000-6-4 (2001)
EN 61010-1 (2001)

8.2.   Metrology

	Leq / Lp channel	Peak channel
Precision class	Class 2	
Linearity domain	80 dB	50 dB(C)
Dynamic range	2 40-120 dB / 60-140 dB	1 (fixed) 93-143 dB
Frequency weightings	A and C in //	C or Z
Measured magnitudes	LAeq, LCeq, LASp, LAFp, LCSp, LCFp LASpmax, LAFpmax	LCpk, LZpk
Configuration	Tc, Lc, LCutoff, Q, LAXMax	135, 137 and 140 dB
Peak counting	-	Yes
Calculated magnitudes	Lex,d, EAT, Dose, SEL, LAvg, TWA, Projected Exp., Projected Dose, Lxx	
Integration time	from 1s to 60s	-

Microphone: type MCE321 class 2, 11 mV/Pa, 9mm, weight < 10 g
Operating temperature: -10°C / + 50°C (0-95% RH)

8.3.   Memory module

Integrated Flash memory, type Micro SD 256 MB
Storage capacity: LAeq (1s) + Lpeak + LCeq > 100 days

8.4.   Battery

Lithium-Ion battery: Licell LIP704765C200-1S1P-PHR2 (3.7V 2AH)
Typical operating life: 50 hours (standard mode) / 10 hours (remote control mode)
Charging time: 2 hours

8.5.   Physical characteristics

Dimensions: 100 mm * 55 mm * 25 mm
Total weight: 140 g

9.   WED007 WEARING

There are several ways to wear dosimeter / exposure meter Wed007 using accessories provided:
- Microphone on the shoulder and dosimeter at the belt
- Dosimeter on the chest pocket

Each solution is compliant with current regulations and shall be selected depending on the requirements of on-site implementation.

9.1.   Shoulder wearing

The microphone is placed on the shoulder using a specific fixing accessory. It is a leather plate containing a powerful fixing magnet. The upper part is used to fix the microphone and its extension cable on the shoulder, while the lower part (which includes a small metallic plate) goes under the fabric. When both parts are brought close together, the magnet pins the microphone to the shoulder, thus ensuring its holding. The capsule points forward, along the head axis.

The lower part includes a cord that the user wears around his/her neck to prevent the part from slipping inside his/her clothes in case of bad implementation.

The extension cable runs down the back of the user and is connected to dosimeter / exposure meter Wed007 clipped to his/her belt.

9.2.   Chest pocket wearing

The instrument is fixed to the operator' pocket using the clip at the rear of Wed007.